

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Use of Spectrum Bands Above 24 GHz For)	GN Docket No. 14-177
Mobile Radio Services)	
)	
Establishing a More Flexible Framework to)	
Facilitate Satellite Operations in the 27.5-28.35)	IB Docket No. 15-256
GHz and 37.5-40 GHz Bands)	
)	
Petition for Rulemaking of the Fixed Wireless)	
Communications Coalition to Create Service)	RM-11664
Rules for the 42-43.5 GHz Band)	
)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95,)	
and 101 To Establish Uniform License Renewal,)	
Discontinuance of Operation, and Geographic)	WT Docket No. 10-112
Partitioning and Spectrum Disaggregation Rules)	
and Policies for Certain Wireless Radio Services)	
)	
Allocation and Designation of Spectrum for)	
Fixed-Satellite Services in the 37.5-38.5 GHz,)	
40.5-41.5 GHz and 48.2-50.2 GHz Frequency)	IB Docket No. 97-95
Bands; Allocation of Spectrum to Upgrade Fixed)	
and Mobile Allocations in the 40.5-42.5 GHz)	
Frequency Band; Allocation of Spectrum in the)	
46.9-47.0 GHz Frequency Band for Wireless)	
Services; and Allocation of Spectrum in the 37.0-)	
38.0 GHz and 40.0-40.5 GHz for Government)	
Operation)	

COMMENTS OF STRAIGHT PATH COMMUNICATIONS INC.

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COMMENTS OF STRAIGHT PATH COMMUNICATIONS INC.

Straight Path Communications Inc. (“Straight Path”) submits these comments in response to the Further Notice of Proposed Rulemaking^{1/} issued by the Commission in the above-referenced proceedings which seeks feedback on additional bands that the Commission may

^{1/} *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, Report and Order and Further Notice of Proposed Rulemaking, GN Docket No. 14-177, *et al.*, FCC 16-89 (July 14, 2016) (subparts referred to herein as the “*Report and Order*” and “*FNPRM*,” respectively).

designate for fifth generation terrestrial mobile (“5G”) use and additional regulations governing spectrum the Commission has already made available for 5G operations. Straight Path applauds the Commission’s actions to date, which have permitted the United States to continue to lead in the introduction of wireless broadband communications. In the next phase of this proceeding, the Commission should make additional spectrum available for mobile terrestrial operations. It should also maximize the opportunities for licensees of spectrum already designated for mobile terrestrial use to fully deploy their authorized frequencies by limiting cumbersome and unnecessary sharing mechanisms.

I. INTRODUCTION AND SUMMARY

The *FNPRM* proposes to adopt service rules for additional bands above 24 GHz.^{2/} It also seeks further comment on possible refinements to the rules adopted in the *Report and Order*.^{3/} Straight Path recommends that the Commission (1) authorize flexible mobile and fixed operations throughout more of the Local Multipoint Distribution Service (“LMDS”) bands; (2) authorize fixed and mobile service operation in the 40-42.5 GHz band under the Part 30 Upper Flexible Microwave Use Service (“UMFUS”) rules; (3) not impose “use-it-or-share-it” performance mechanisms; (4) adopt clear performance mechanisms; (5) impose only band specific aggregation limits; (6) impose limited, or no, spectrum holding period; and (7) protect mobile operations in the 37 GHz and 39 GHz bands by maintaining current limitations on power flux density (“PFD”) levels for fixed satellite service (“FSS”) operations.

^{2/} *FNPRM* at ¶ 369.

^{3/} *Id.*

II. THE COMMISSION SHOULD AUTHORIZE FLEXIBLE USE LICENSES IN ADDITIONAL SPECTRUM BANDS ABOVE 24 GHz

The *FNPRM* seeks comment on the Commission's proposals to authorize flexible mobile and fixed services in the following bands: 24.25-24.45 GHz together with 24.75-25.25 GHz (the "24 GHz bands"), 31.8-33.4 GHz (the "32 GHz band"), 42-42.5 GHz (the "42 GHz band"), 47.2-50.2 GHz (the "47 GHz band"), 50.4-52.6 GHz (the "50 GHz band"), the 71-76 GHz band together with the 81-86 GHz band (the "70/80 GHz bands"), and bands above 95 GHz.^{4/}

Straight Path generally supports the designation of additional bands above 24 GHz for flexible use licenses to provide terrestrial services. In addition to the bands identified in the *FNPRM*, however, the Commission should also authorize flexible use licenses in the LMDS A3, B1, and B2 bands. Among the bands listed above, Straight Path particularly supports the authorization of flexible mobile and fixed services in the 42 GHz band and the adoption of rules that would permit terrestrial mobile use of the adjacent 40-42 GHz band. Authorization of UMFUS in the 40-42 GHz band would be consistent with the Commission's soft-segmentation plan for terrestrial/satellite sharing in the 37.5-42 GHz band (the "V-band").

A. The Commission Should Authorize Flexible Mobile and Fixed Services Throughout Additional LMDS Band Spectrum.

Although not included among the bands identified in the *FNPRM* as candidates for flexible use licensing, Straight Path recommends that the Commission extend its UMFUS framework throughout more of the LMDS band. The LMDS "A" band includes a total of 1,150 megahertz and consists of 27.5-28.35 GHz (the "A1 band"), 29.1-29.25 GHz (the "A2 band"), and 31.075-31.225 GHz (the "A3 band"). The LMDS "B" band is 150 megahertz wide and consists of 31-31.075 GHz (the "B1 band") and 31.225-31.3 GHz (the "B2 band"). In the *Report*

^{4/} *Id.* at ¶¶ 5, 373.

and Order, the Commission authorized mobile use of only the LMDS A1 band. Many parties that submitted comments on the initial *NPRM*^{5/} in this proceeding also urged the Commission to extend the UMFUS framework to additional spectrum in the LMDS band.^{6/} Yet despite this widespread support in the record, the Commission did not include any of the remaining LMDS band spectrum among the 17.7 GHz of spectrum it now proposes to make available for mobile operations.

Expanding the UMFUS framework to include the LMDS A3, B1, and B2 bands would provide additional contiguous 300 megahertz of spectrum between 31 GHz and 31.3 GHz to support 5G mobile operations. Straight Path does not necessarily recommend conversion of the LMDS A2 band at this time. The A2 band is not contiguous with other LMDS spectrum. Moreover, as the record in this proceeding has demonstrated, there continues to be significant interest in using this spectrum for satellite operations.

While the LMDS A3 and B bands represent only an additional 300 megahertz of spectrum, parties have pointed out that even small contiguous blocks of LMDS spectrum could prove capable of supporting innovative 5G wireless services. For example, T-Mobile explained that “as millimeter wave technology matures, smaller bandwidths like 150 megahertz and 300 megahertz could prove much more effective than what may be attainable today.”^{7/} XO

^{5/} *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Notice of Proposed Rulemaking, 30 FCC Rcd. 11878 (2015) (“*NPRM*”).

^{6/} See, e.g., Comments of the National Cable & Telecommunications Association, GN Docket No. 14-177, *et al.*, at 18-20 (filed Jan. 28, 2016); Comments of T-Mobile USA, Inc., GN Docket No. 14-177, *et al.*, at 7-8 (filed Jan. 27, 2016) (“T-Mobile Comments”); Comments of XO Communications, LLC, GN Docket No. 14-177, *et al.*, at 3, 7, 11-18 (filed Jan. 28, 2016) (“XO Comments”); Comments of Verizon, GN Docket No. 14-177, *et al.*, at 6 n.4 (filed Jan. 28, 2016) (“Verizon Comments”); Comments of Mobile Future, GN Docket No. 14-177, *et al.*, at 9-10 (filed Jan. 27, 2016); Comments of Nokia, GN Docket No. 14-177, *et al.*, at 3, 12-13 (filed Jan. 27, 2016); Reply Comments of Samsung Electronics America, Inc. and Samsung Research America, GN Docket No. 14-177, *et al.*, at 14-15 (filed Feb. 26, 2016).

^{7/} T-Mobile Comments at 7-8.

Communications likewise urged the Commission to extend its UMFUS rules to the entire LMDS band in order to maximize the amount of spectrum for 5G mobile services. XO noted that “[w]hile the NPRM suggests that 5G mobile operations require contiguous spectrum blocks of 500 megahertz or greater, evidence in the record shows that spectrum blocks only a fraction of that size can support 5G mobile services.”^{8/}

The Commission’s rationale for authorizing mobile operating rights in the 28 GHz band applies to the LMDS A3 and B bands. In the *Report and Order*, the Commission explained that its grant of mobile operating rights to existing LMDS licensees in the 28 GHz band was “in fulfillment of the Commission’s original mobile allocation for 28 GHz and its stated expectation of allowing mobile use in the band[.]”^{9/} But as Verizon noted, that expectation extended to all LMDS bands.^{10/} Verizon therefore recommended that “in addition to granting flexible use for the A1 sub-band, the Commission should consider also including the B Block and the rest of the A Block when granting flexible-use rights.”^{11/}

B. Inclusion of the 40-42.5 GHz Band Would Preserve a Compromise Between Mobile and Satellite Services.

The Commission proposes to authorize flexible use operations in the 42-42.5 GHz band under the Part 30 UMFUS rules, subject to the condition that adjacent channel radio astronomy service (“RAS”) services will be protected.^{12/} Straight Path supports this proposal. It also urges the Commission to authorize mobile operations in the 40-42 GHz band. Permitting mobile

^{8/} XO Comments at 15. XO also proposed that “[i]f the Commission does not consider permitting 5G mobile in these LMDS sub-bands in its upcoming order at this time, it should issue as soon as possible a notice that examines the 5G transition for these additional LMDS blocks.” *Id.* at 16.

^{9/} *Report and Order* at ¶ 41.

^{10/} Verizon Comments at 6 n.4.

^{11/} *Id.*

^{12/} *FNPRM* at ¶ 403.

operations throughout the 40-42.5 GHz band would be consistent with the Commission’s “soft segmentation” approach and its rules permitting FSS operations in the 37-40 GHz band.^{13/}

Throughout the course of this proceeding, Straight Path has supported an approach that would maintain the essential features of the Commission’s soft segmentation plan in the V-band,^{14/} which is allocated for use by both terrestrial and satellite services.^{15/} The soft segmentation plan favors the deployment of terrestrial services in the 37.5–40 GHz portion of the V-band and the deployment of satellite services in the 40–42 GHz portion of the band.¹⁶

But the *Report and Order* adopts rules that expand satellite use of the 37.5-40 GHz band.^{17/} The Commission should therefore modify its rules to reflect a parallel approach in the

^{13/} 47 C.F.R. § 25.136 (Earth Stations in the 27.5-28.35 GHz and 37.5-40 GHz bands); *Report and Order* at ¶¶ 88-93; *see also* *Allocation and Designation of Spectrum for Fixed Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations*, Second Report and Order, 18 FCC Rcd. 25428, ¶¶ 1-3, 23-24 (2003) (“*V-Band Second Report and Order*”) (adopting satellite PFD limits consistent with the Commission’s soft segmentation approach).

^{14/} *See, e.g.*, Letter from Davidi Jonas, CEO and President, Straight Path Communications Inc. to Marlene H. Dortch, Secretary, FCC, in GN Docket No. 14-177 (filed May 13, 2016); Letter from Davidi Jonas, CEO and President, Straight Path Communications Inc. to Marlene H. Dortch, Secretary, FCC, in GN Docket No. 14-177 (filed July 7, 2016) (“*Straight Path July 7, 2016 Ex Parte Letter*”).

^{15/} *See* U.S. Table of Frequency Allocations.

^{16/} *See V-Band Second Report and Order* at ¶¶ 1-3, 12-14 (codifying soft-segmentation plan consistent with a global sharing plan adopted at the 2000 World Radio Conference, “which imposed a more rigorous satellite PFD limit from 37.0-40.0 GHz favoring terrestrial uses, and a less rigorous PFD limit from 40.0-42.0 GHz favoring satellite uses.”); *see also* *Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations*, Third Further Notice of Proposed Rulemaking, 25 FCC Rcd. 15663, ¶ 7 (2010) (“In making its decision [in the *V-Band Second Report and Order*], the Commission sought to bring technical and regulatory certainty to systems currently operating in the 37.0-40.0 GHz portion of the spectrum and to codify the concept of soft segmentation, thus allowing ubiquitous deployment of FS and FSS operations in the V-band.”).

^{17/} *See* 47 C.F.R. § 25.208 (Power flux density limits); *see also* *Report and Order* at ¶ 93 (“[The Commission] will authorize non-Federal satellite earth stations in the 39 GHz band on a first-come, first-served basis that will entitle them to protection from terrestrial transmissions” subject to certain

40-42 GHz band. Notably, there are currently no FSS operations in the 40-42 GHz band. Allowing flexible use operations throughout the 40-42.5 GHz band would allow terrestrial providers to make use of spectrum that is currently lying fallow. Moreover, making the 40-42.5 GHz band available for terrestrial operations would potentially create 5.5 gigahertz of contiguous spectrum (between 37 GHz and 42.5 GHz) where terrestrial operations would be permitted. To the extent there are concerns about terrestrial operations sharing the 40-42 GHz band with FSS, the Commission could establish conditions on such terrestrial operations, just as it established conditions on satellite operations in the 37.5-40 GHz band, in order to protect future FSS deployments. For example, Boeing claims that FSS with a PFD limit of $-105 \text{ dBW/m}^2/\text{MHz}$ can coexist with 5G services with a base station EIRP limit of 62 dBm/100MHz and a mobile station EIRP limit of 43 dBm.^{18/} This recommendation can be used as a starting point to evaluate sharing the 40–42 GHz band between FSS and UMFUS.

III. THERE SHOULD BE NO “USE-IT-OR-SHARE-IT” RULES IN THE MILLIMETER WAVE BANDS.

In the *Report and Order*, the Commission adopted a licensing approach that divides the 37 GHz band into two segments: a lower band segment from 37-37.6 GHz and an upper band segment from 37.6-38.6 GHz.^{19/} The lower band segment will be reserved for shared use between federal and non-federal users.^{20/} The upper segment of the band will be licensed under

conditions), ¶ 105 n.272 (“Since the considerations for satellite sharing in the 37.5-40 GHz band are identical to the considerations present in the 39 GHz band, [the Commission] will adopt the same rules for terrestrial sharing for both bands.”).

^{18/} Letter from Bruce Olcott, Counsel to The Boeing Company to Marlene H. Dortch, Secretary, Federal Communications Commission, in GN Docket No. 14-177, *et al.*, at 4-5 (filed July 5, 2016).

^{19/} *Report and Order* at ¶ 111.

^{20/} *Id.* at ¶ 112 (also acknowledging support in the record to license the entire 37 GHz band by geographic area).

the same framework as the 39 GHz band.^{21/} The *FNPRM* seeks comment on the most appropriate coordination mechanism for facilitating federal and non-federal access to the lower band segment of the band and whether to impose a “use-it-or-share-it” mechanism in the upper band segment.^{22/}

The Commission should not adopt a “use-it-or-share-it” plan for the upper segment of the 37 GHz band. In the *Report and Order*, the Commission notes that “by applying the same licensing and technical rules to the upper band segment and the 39 GHz band, [it has] created 2,400 megahertz of contiguous spectrum that will give commercial operators the flexibility to combine or pair this spectrum to suit their own needs.”^{23/} Imposing burdensome requirements to UMFUS licensees in the upper band segment—such as a “use-it-or-share-it” obligation—would undermine the benefits of using the same licensing scheme in both the 37.6-38.6 GHz band and the 39 GHz band. Under this scenario, a single licensee holding contiguous spectrum across those two bands could be subjected to different regulatory requirements for its spectrum below 38.6 GHz and its spectrum above 38.6 GHz. This result is incongruous with the Commission’s goal of creating a consistent and coherent licensing framework that can be applied throughout the millimeter wave bands.^{24/}

The Commission separately seeks further comment on the possibility of implementing a “use-it-or-share-it” regime generally in the UMFUS bands.^{25/} The Commission requests input on four variations of a “use-it-or-share-it” mechanism, including proposals to (1) automate shared access to enable dynamic opportunistic sharing; (2) rely on more traditional frequency

^{21/} *Id.* at ¶¶ 117, 122-124.

^{22/} *FNPRM* at ¶¶ 448-450.

^{23/} *Id.* at ¶ 446.

^{24/} *See Report and Order* at ¶ 123.

^{25/} *FNPRM* at ¶¶ 474-482.

coordination; (3) establish pre-defined geographic areas that will be available for shared access, depending on a licensee's construction; or (4) implement unlicensed shared access, similar to in TV white spaces, in the unused portions of the UMFUS bands where the licensee is not actually deployed.^{26/} The Commission also seeks comment on how to define a licensee's "use" of its licensed spectrum.^{27/} Finally, it seeks comment on any other mechanisms of opportunistic sharing that could enhance spectrum efficiency in the UMFUS bands.^{28/}

Straight Path agrees with the numerous wireless carriers, millimeter wave providers, equipment manufacturers, technology companies, and other parties who overwhelmingly opposed the adoption of a "use-it-or-share-it" obligation in their comments on the *NPRM*.^{29/} First, the "use-it-or-share-it" proposals are unnecessary. The *Report and Order* made available an additional seven gigahertz of spectrum for unlicensed use—almost double the 3.85 gigahertz of spectrum it set aside for licensed, flexible use.^{30/} With up to 14 gigahertz of spectrum available for unlicensed use in the 57-71 GHz band, the Commission's proposals for additional sharing in the licensed UMFUS bands are unnecessary.

Second, the Commission's "use-it-or-share-it" proposals are impractical. They require licensees to frequently update the status of their use of particular spectrum—exactly the opposite of the flexibility inherent in the Commission's geographic area licensing scheme. They also

^{26/} *Id.* at ¶¶ 476-480.

^{27/} *Id.* at ¶ 481.

^{28/} *Id.* at ¶ 482.

^{29/} See, e.g., Comments of AT&T, GN Docket No. 14-177, *et al.*, at 20-22 (filed Jan. 28, 2016) ("AT&T Comments"); Verizon Comments at 20-21; Comments of CTIA®, GN Docket No. 14-177, *et al.*, at 26-27 (filed Jan. 28, 2016) ("CTIA Comments"); Mobile Future Comments at 15-16; Nokia Comments at 19-20; Comments of Qualcomm Incorporated, GN Docket No. 14-177, *et al.*, at 12-14 (filed Jan. 27, 2016); Comment of Intel Corporation, GN Docket No. 14-177, *et al.*, at 20-22 (filed Jan. 26, 2016); XO Comments at 29-32; Comments of the High Tech Spectrum Coalition, GN Docket No. 14-177, at 4-5 (filed Jan. 28, 2016).

^{30/} See *Report and Order* at ¶¶ 129-130.

unnecessarily create a layer of spectrum management—using a third party database, coordination mechanisms, or otherwise—to facilitate potential use of licensed spectrum not in operation by the licensee. There is no basis for the Commission to impose such a cumbersome structure, particularly when licensees have an economic incentive, and the tools of disaggregation, partitioning and leasing, to make the most intense use possible of their licensed spectrum.

Others have agreed. As AT&T explained in its comments on the *NPRM*, a “use-or-share” obligation would “inject unnecessary complexity into the already arduous task of deploying 5G networks” and “could jeopardize the commercial viability of the UMFUS spectrum.”^{31/} AT&T further noted that “for licensees to invest in both the licenses and infrastructure needed to bring 5G to bear, they must have certainty that they will be able to freely and fully access their licensed spectrum without interference.”^{32/} CTIA also commented that it opposes any form of “use-it-or-share-it” requirements.^{33/} It noted that such obligations would be “entirely premature” given the nascent nature of millimeter wave technology and that “[r]equiring licensees to share their spectrum with other uses while deploying or expanding their networks would undermine and/or delay the provision of service.”^{34/}

Straight Path therefore urges the Commission not to experiment with unproven, impractical sharing frameworks that could create uncertainty and discourage investment in and deployment of 5G mobile broadband technologies and services.

^{31/} AT&T Comments at 20-22.

^{32/} *Id.*

^{33/} CTIA Comments at 26.

^{34/} *Id.*

IV. THE COMMISSION SHOULD ADOPT CLEAR PERFORMANCE METRICS

The *FNPRM* asks whether the Commission should adopt clear benchmarks or guidance for a build out in cases where a licensee provides a combination of fixed, mobile, and other services.^{35/} Straight Path agrees that licensees and the public are best served by clear regulatory guidance. The Commission has usefully provided incumbent 28 GHz and 39 GHz licensees with “safe harbor” guidelines to determine when authorizations are providing the level of substantial service that merits renewal.^{36/} And in the *Report and Order*, it provided guidance on how it will evaluate 5G fixed and mobile deployments.^{37/} The Commission should adopt the same approach for other forms of millimeter wave deployment. Nevertheless, Straight Path recognizes that the use cases for 5G have not been, and may not be, fully developed for years. Therefore, even if the Commission offers a safe harbor for combined services, it must retain the flexibility for licensees to be able to demonstrate that the service they provide is “substantial” even if it does not meet the safe harbor guidelines. While safe harbor standards will be beneficial for licensees, they should not unnecessarily constrain licensees’ development of innovative services based on a concern that the provision of those services will limit the opportunity for license renewal.

If the Commission creates population-based performance metrics, then it should re-evaluate its usual approach of measuring population based on census data. New applications, such as Internet of Things, may make it more appropriate to measure daytime or transient population to determine intensity of spectrum use. While the Commission may wish to adhere to the standard census-based calculation for some services that exist today, it should allow licensees to employ other population metrics for other, yet-to-be-defined services.

^{35/} *FNPRM* at ¶ 470.

^{36/} *See Report and Order* at ¶¶ 203-210, 219-220.

^{37/} *Id.* at ¶¶ 206-207.

V. THE COMMISSION SHOULD ADOPT ONLY BAND-SPECIFIC AGGREGATION LIMITS

In the *Report and Order*, the Commission adopted an *ex ante* limit of 1,250 megahertz of millimeter wave spectrum for auctions and a screen of the same amount of spectrum for transactions.^{38/} The Commission did not impose a band-specific screen. In the *FNPRM*, the Commission proposes to continue this approach, and it would use an approximately one-third threshold of all millimeter wave band spectrum to evaluate spectrum holdings.^{39/} This proposal ignores the fact that millimeter wave band spectrum is not fungible. In addition to different propagation characteristics, each band will have different regulatory limitations—for example, satellite or federal sharing obligations. Therefore, the better approach is to use an in-band spectrum aggregation limit of, for example, 50 percent of the available spectrum.^{40/} This will ensure that competitors have a fair opportunity to acquire spectrum in each millimeter wave bands. An overall one-third limit would also potentially foreclose a licensee of one spectrum band from ever acquiring needed spectrum in another millimeter wave band.

VI. THERE SHOULD BE A LIMITED, OR NO, SPECTRUM HOLDING PERIOD

The *FNPRM* asks whether the Commission should adopt a holding period that would preclude certain proposed secondary market transactions for licensees that acquire 28 GHz, 37 GHz, or 39 GHz spectrum at auction.^{41/} Instead of promoting competition, a holding period may impede use of millimeter wave spectrum. For example, an auction winner may legitimately determine that it does not wish to pursue the development of a 5G network. Commission

^{38/} *Id.* at ¶ 184.

^{39/} *FNPRM* at ¶ 491.

^{40/} Incumbent licensees should not be required to divest spectrum as a result of this limit; however, the limits would apply to them in the context of upcoming auctions and transactions.

^{41/} *FNPRM* at ¶ 488.

regulations should not prevent that spectrum from being assigned to an entity that will use it to develop such a network.

The Commission's proposal appears to be based on the 600 MHz incentive auction.^{42/} However, in that auction, the Commission adopted limitations on spectrum acquisition at auction specifically intended to promote competition. The Commission has correctly not proposed a similar structure here (although it has imposed *ex ante* limits with which Straight Path agrees). There is therefore no basis in the record for restricting post-auction spectrum transactions for the millimeter wave bands.

VII. THE COMMISSION SHOULD NOT INCREASE THE POWER FLUX DENSITY LIMITS FOR SATELLITE OPERATIONS IN THE 39 GHz BAND

The *FNPRM* seeks comment on whether there are any circumstances under which allowing FSS satellites in the 37.5-40 GHz band to operate at a higher PFD level than permitted under the existing rules would be consistent with terrestrial use of the 37.5-40 GHz band and, if so, the higher PFD limit that would be appropriate.^{43/} The Commission recognizes that Straight Path, FiberTower, and T-Mobile oppose any increase in satellite PFD levels, and it specifically notes that Straight Path provides the most detailed critique.^{44/} It further states that it “do[es] not believe that the current record is sufficient for [the Commission] to conclude that authorizing satellites to operate at the higher PFD of -105 dBW/m²/MHz would be consistent with terrestrial

^{42/} See *id.* (discussing *Policies Regarding Mobile Spectrum Holdings, Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, 29 FCC Rcd. 6133, ¶¶ 196-200 (2014)).

^{43/} *Id.* at ¶ 499.

^{44/} *Id.* at ¶ 496.

use of the 37.5-40 GHz band.”^{45/} Additionally, the Commission believes that “the burden is on FSS interests to show that the higher PFD level is consistent with terrestrial use.”^{46/}

Straight Path has already provided a detailed link budget analysis for various interference scenarios between FSS and 5G services in the 37/39 GHz band.^{47/} At the current PFD limit of -117 dBW/m²/MHz, the FSS downlink (space-to-earth) already causes non-negligible impairment to both 5G base stations and mobile station receivers. Increasing the PFD limit further will more severely impact the 5G user experience and the economic prospect of providing 5G services to the American public. Other commenters, including CTIA, the National Spectrum Management Association, T-Mobile, FiberTower, and PHAZR, agree.^{48/} CTIA points out that “[a]s for the 37.5-40 GHz band, the spectrum usage rights of satellite incumbents are extremely limited” while “both the Commission in the Spectrum Frontiers NPRM and the wireless industry in this proceeding have made significant accommodations to satellite incumbents.”^{49/} It further states that “[s]ubjecting mobile licensees to an unlimited and never-ending series of attempts to elevate satellite users and obtain preferential access to millimeter wave spectrum would introduce uncertainty about licensees’ rights in the band and risk delaying or foreclosing deployment of

^{45/} *Id.* at ¶ 497.

^{46/} *Id.* at ¶ 499.

^{47/} Comments of Straight Path Communications, Inc., GN Docket No. 14-177, *et al.*, at 30-37 (filed Jan. 27, 2016) (“Straight Path Comments”).

^{48/} See Letter from Scott K. Bergmann, Vice President, Regulatory Affairs, CTIA to Marlene H. Dortch, Secretary, FCC, in GN Docket No. 14-177, *et al.* (filed July 7, 2016) (“CTIA Ex Parte Letter”); Letter from George Kizer, President, National Spectrum Management Association to Marlene H. Dortch, Secretary, FCC, in GN Docket No. 14-177 (filed July 6, 2016); Letter from Steve B. Sharkey, Vice President, Government Affairs, Technology and Engineering Policy, T-Mobile US, Inc. to Marlene H. Dortch, Secretary, FCC, in GN Docket No. 14-177 (filed June 30, 2016); Letter from Joseph M. Sandri, FiberTower Corporation to Marlene H. Dortch, Secretary, FCC, in GN Docket No. 14-177, *et al.* (filed July 7, 2016); Letter from Farooq Khan, CEO, PHAZR to Marlene H. Dortch, Secretary, FCC, in GN Docket No. 14-177 (filed July 6, 2016) (“PHAZR Ex Parte Letter”).

^{49/} See CTIA Ex Parte Letter at 1, 3.

5G.”^{50/} PHAZR notes that interference caused by FSS to 5G base stations and mobile stations at the current PFD limits already “far exceed the noise floor,” and it believes that “[PFD] limits on satellite networks require strengthening in order to protect future 5G network operations.”^{51/}

The Commission also seeks comment on the possibility of repealing the prohibition on satellite user equipment in the 37.5-40 GHz band.^{52/} Straight Path strongly opposes this proposal. As the Commission has long and correctly recognized in its soft-segmentation compromise for the V-band, high-density deployment of terrestrial services and high-density deployment of FSS user equipment in the same frequency band is technically infeasible. Straight Path’s analysis shows that a sizeable exclusion zone per earth station is needed in order to protect satellite earth stations from terrestrial interference.^{53/} Satellite user equipment with less antenna gain, wider beams, larger side lobes, and less interference rejection capability than a satellite earth station will be at least as likely to be interfered by 5G services, if not more so. While satellite user equipment will not transmit in the 37/39 GHz band and thus will not create interference to 5G services, such equipment, once deployed, cannot coexist with 5G services and devices in its proximity. The *Report and Order* correctly establishes exclusion zones for a limited number of satellite earth stations so that FSS can operate in the 37 GHz and 39 GHz bands without creating coordination challenges that would impede 5G services.^{54/} Allowing unlimited satellite user equipment in the 37 GHz and 39 GHz bands, even with secondary status, will pose a significant business risk for 5G services in this band and discourage network and infrastructure investment needed for the success of 5G.

^{50/} *Id.* at 1.

^{51/} See *PHAZR Ex Parte Letter* at 1, Attachment.

^{52/} *FNPRM* at ¶¶ 500-502.

^{53/} Straight Path Comments at 36-37.

^{54/} See *Report and Order* at ¶ 93.

The abilities to use a higher PFD limit of $-105 \text{ dBW/m}^2/\text{MHz}$ and high-density deployment of satellite user equipment are already in place for FSS in the 40–42 GHz band. Yet more than 10 years after this band has been made available, no FSS service has been deployed. As our previous analysis shows, in urban, suburban, and rural areas where most of the Americans live, terrestrial services can achieve about 100,000 times better spectrum utilization than FSS.^{55/} While Straight Path acknowledges that there is a place for FSS in broadband services (*e.g.*, providing backhaul and access in remote areas where terrestrial services are not economically viable), we emphasize that FSS will only play a very small role in providing broadband to the American public, even in rural areas.^{56/} Harming the prospect of 5G services in the 37 GHz and 39 GHz bands that will benefit most of the American public to further accommodate the demand by the FSS interest that is already fulfilled in the 40-42 GHz band—which has been lying fallow for more than 10 years—does not serve the public interest.

VIII. CONCLUSION

Straight Path commends the Commission on its continuing efforts to facilitate the deployment of 5G mobile broadband technologies and to maintain the United States’ leadership in the mobile wireless industry. It therefore strongly supports the Commission’s efforts to designate additional spectrum above 24 GHz to foster the growth of next-generation mobile broadband technologies and services. Straight Path encourages the Commission to expand its UMFUS framework throughout more of the LMDS bands and to authorize terrestrial operations in the 40-42.5 GHz band consistent with its soft-segmentation approach. Straight Path also urges the Commission to protect terrestrial operations in the 39 GHz band by maintaining the current

^{55/} Straight Path Comments at 27-30.

^{56/} See *Straight Path July 7, 2016 Ex Parte Letter* at 4 (“Satellite is not, and will not be a significant provider of rural broadband service”).

PFD limits on FSS operations in the band. The Commission should adopt clear performance standards that are not necessarily based on census data, impose only band-specific aggregation limits and a limited holding period, if any. Finally, the Commission should decline to adopt any unnecessary and impractical “use-it-or-share-it” requirements in the upper segment of the 37 GHz band—or in any other UMFUS bands—that would limit the licensees’ ability to maximize their use of the spectrum and would jeopardize deployment of 5G services.

Respectfully submitted,

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